

DATA PROCESSING DIGEST

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General Information

LATEST DEVELOPMENTS IN ELECTRONIC PROCESSING OF CHECKS

Edward T. Shipley, Wachovia Bank and Trust Co., Winston-Salem, North Carolina
AUDITGRAM, November 1958; pages 26-33, 48

The conclusions reached by the ABA on specifications for coded checks are discussed, and the reasons behind the decisions are given in this meaty article. Some methods of assigning account numbers are also discussed. In the matter of identifying checks, it is pointed out that something other than the magnetic ink account number may be needed. For example, considering the possibility of customers exchanging or borrowing checks, the account number of the check's original owner would be read automatically unless other identification on the check would cause it to be kept out of the automatic system. Thus, it would be advisable for at least the customer's name to be imprinted on the check, in addition to the account number.

Tests are being made by the Battelle Memorial Institute of Columbus, Ohio, and it is believed that intra-bank automatic check-handling may become possible in 1959. It will take some time, perhaps many years, before all banks will participate in the standardized procedures, making inter-bank automation a reality.

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((For those wishing to be brought up to date quickly on bank check processing, this article is recommended. Also, see Comment, this issue.))

LOOKING AHEAD ON AUTOMATION

Jack Raleigh, U.S. National Bank, Portland, Oregon
BANKING, Novemer 1958; pages 48, 49, 144

The U. S. National Bank has expanded its SONIA system ((see DPD: May 1958, page 4, "Sonia--A System of Posting Bank Checking Accounts")) to the processing of 78,000 accounts and foresees the possibility of reaching a top limit of 105,000 accounts. The top limit is imposed because of the limitations of time and transportation. SONIA is carried out partially at the branches and

partially at the main office. In two branches, processing has been speeded-up to 8500 accounts per hour. Plans are being made now to utilize two input-output units on the computer to post two branches simultaneously. Tests indicate that between 10,000 and 11,000 accounts per hour can be processed. The new programs provide additional information such as average balance, minimum balance, automatic posting of service charges, stop payment indication, automatic pulling of dormant accounts, and debit and credit item counts as separate figures.

*SONIA will continue under
ABA specifications*

SONIA will be compatible with the new ABA magnetic ink specifications. Items sorted by magnetic ink reader will be again passed through the sorter, which is directly coupled with the computer (this is possible according to the manufacturer), and the account information read into the computer system, simultaneously as the balances are read in by card. Balances will be stored four to a card as in the present system. When all four balances on a card are updated, a new card is produced. Projected speed is 15,000 accounts per hour, so that the 105,000 accounts anticipated can be posted in seven hours a day.

Since all accounts have been sorted, branches will not have this chore. The bank is considering eliminating check filing, also; checks would be stored by date after examination. At the end of the statement cycle, all checks would be returned to the computer center for resorting by account, along with coded statements which will make convenient guides for separating accounts. This will simplify statement preparation and mailing.

Some problems which need solving: large errors could be made in coding amounts on checks; large deposit slips will not be compatible with the system; there is a need for punch-card activated encoders.

EDP—ITS IMPACT ON JOBS, PROCEDURES AND PEOPLE

*J. Douglas Elliott, The Detroit Edison Company
THE JOURNAL OF INDUSTRIAL ENGINEERING, September-October, 1958, pages 407-410*

The Detroit Edison company has about 11,000 employees, of whom about 1,000 were involved in the recent changeover to an electronic system of the total customer accounting and collecting area of activity. The study was begun in 1953, and after 14 months, an IBM 705 was selected.

The purpose of the original study was primarily economic. "We wanted to see how we could reduce costs in this area; improve our procedures in order to maintain or improve our relationship with our customers; and we wanted to design and organize a system so that we would be ready to utilize electronic equipment eventually."

Customer billing on IBM 705

Programers were selected in 1954, and conversion to the new system began in February, 1957. "We had to convert gradually because we had to keep the bills going out to our customers so we could keep the money coming in. We planned a 9-month conversion period which actually took 14 months. Very careful planning was necessary to make not only the change to the computer but also to make other clerical changes. In fact, some of these clerical changes were well under way when we started converting. . . . At the moment, we are utilizing the computer only for the billing of our accounts and maintaining of our customer records."

*Average wage level
remained same*

The system planning group found they had underestimated the amount of individual judgment being used in the handling of exceptions which were not included in the 30,000 program instructions. Also, they discovered the importance of programing many checks and controls omitted from the original programs. As a result, the program instructions have been increased by 40%, in addition to 20,000 instructions to take care of the conversion.

The prediction that the average wage level of jobs other than the programing staff would rise has not proved out, and the wage level has remained the same. The company finds its programers from within the company, but not among file clerks, key punch operators or similar levels of personnel. The electronic system has enabled the company to reduce the work force somewhat, and to reduce the number of job classifications by about 50%. About 90% of the people working in the customer billing area (400 clerical people) had to learn a major part of their job or a new job all over again. Another 500 people not directly related to the computer operation had to adjust to the new system. These were personnel in various customer relations activities.

*Personnel increased
during changeover*

"... We had to increase our number of people and create many temporary jobs because, during conversion, we actually had three systems in operation. We had to have X number of people operating the old system, X number of people operating the new system, and X number of people working on the conversion operations. So in order to install a computer to reduce our work force, we had to increase our work force by 60 people."

The company pledged that once the conversion was over, all jobs in the new system would be open to all employees, regardless of their previous experience in the new system. "Detroit Edison has established a policy that no employee will be laid off as a result of technological improvement. As a result, nobody will lose his job. However, we shouldn't be naive enough to think this solves all of our problems. Even though an employee knows that he has job security he worries about other things. He may have to learn a job all over again; maybe he has performed this job for 20 years and now has to start all over by learning another job at 62 years of age. Also, he may have to work for a new boss, and possibly work in a new department or work on a new shift. It is normal, therefore, for employees to resist change."

The company viewed the most important personnel problem to be among those who would be most directly related to the computer, organizationally. Hence, the 400 persons whose jobs had to do with input, output, or the operation of the system received the most attention in the matter of resistance to change. The company did not just install a computer; it changed clerical work groups and many company policies, and did a great deal of reorganization. The 400 employees were kept informed of the changes, and cooperated through the established plan of participative management long in effect. This group of employees made the changeover with success.

Company erred in not informing all employees

However, the company felt it was not necessary to completely orient the employees working in areas of customer relations, since they were not directly concerned with the computer. This proved to be a serious mistake. "These people, whom we did not orient completely, were somewhat resentful because some of their decision making was now being done by the computer or standardized by policy changes. They did not understand the reason for many changes made in policy and procedures. This resentment resulted in accusations, the magnification of errors, and frictions between the less oriented employees contacting the customers and the more oriented employees maintaining the accounts. It also resulted in much challenging of procedures, which had been approved by their own superiors in this indirect area of responsibility."

The seriousness of the problem resulted in the hiring of some outside consultants to view the system and its effect on people. They showed that "the basic trouble was insufficient communications and training among employees and inadequate opportunities to participate in the change and to know what was going on."

"It's not the computer standing in that nice computer room, it's not the flow chart on the wall, but it's the human endeavor behind it that counts."

MANAGEMENT IN THE 1980's

Harold J. Leavitt, Carnegie Institute of Technology; and Thomas L. Whisler, University of Chicago
HARVARD BUSINESS REVIEW, November-December 1958; pages 41-48

The authors see business in the future being characterized by a new technology which they choose to call information technology. It is composed of several related parts: techniques for processing large amounts of information rapidly, the application of statistical and mathematical methods to decision-making problems, and the simulation of higher-order thinking through computer programs. They foresee this new technology having a profound impact upon the middle and top management organization of businesses: 1) planning will be taken from middle management and given to top level specialists; 2) large industrial organizations will recentralize with top management taking on a larger proportion of the "creative" functions; 3) a radical reorganization of middle-management levels will see

*Middle management
will move up—and down*

some moving downward, and others moving up into top levels; 4) the line separating the top from the middle will be more severe.

The authors also believe information technology will spread rapidly because it will make centralization much easier, it will allow fewer people to do more work, and will help management to cope with increasingly complicated engineering, logistics, and marketing problems. "Researchers or people like researchers will be closer to the top management in larger numbers, and highly creative people will be sought after and more highly valued than at present. But since researchers may be as interested in technical problems and professional affiliations as in progress up the organizational ladder, we might expect more impersonal, problem-oriented behavior at the top, with less emphasis on loyalty to the firm and more on relatively rational concern with solving difficult problems."

*Researchers and planners
will be at the top level*

Others at top level will be programmers, who will be concerned with the internal organization--that is, the operations researchers, mathematical programmers, computer experts, and the like. Managers will become "coordinators" and "committees" who coordinate the efforts of the top level creative people and approve or veto decisions. Thus, the top men will operate as a committee.

Some radical changes in some administrative practices are foreseen: multiple entry points into the organization; multiple sources of potential managers; apprenticeship for manager training will decline; top management training will be assumed by universities; higher management performance appraisal by peers; more precise appraisal of middle managers; compensation for top level people influenced strongly by market forces; new kinds of compensation practices, such as team bonuses.

Businessmen can prepare for this future by closer liaison with appropriate research organizations, and by re-examining their own organizations for potential information technologists.

PRACTICAL USES OF TODAY'S POINT-OF-SALE RECORDERS

*Ethel Langtry, NRMA Research Institute
STORES, October 1958; pages 75, 76*

An Electronics Committee has been formed by the Retail Research Institute of the National Retail Merchants Association. This permanent committee will investigate the use of point-of-sale recorders and their use in an electronic system.

The Committee sees point-of-sale recorders to be of advantage in three kinds of sales situations: 1) in departments having a large number of small transactions and where management requires detailed classification information; 2) wherever there is much interselling among departments; 3) in departments where there are many salespeople but comparatively few transactions (e.g., a furniture department).

Two reasons for the slow acceptance of point-of-sale recorders are the high initial cost and the inability of present recorders to read more than one type of punched ticket.

The committee consists of controllers, researchers, operations and methods directors, store principals of chain, large and small department and specialty stores. Local committees will be encouraged to organize to assist in overall industry research on retail store electronics.

AUTOMATION FOR THE SMALLER BANK

*Raymond C. Kolb, Mellon National Bank and Trust Co., Pittsburgh, Pa.
UNITED STATES INVESTOR, November 8, 1958; pages 11-14, 52*

The ABA specifications for bank automation will apply to small banks as well as the larger ones, since the problems of banks of various sizes differ only in degree.

Because equipment is being built on the building block principle, small banks can use equipment suited to their size and budget. It is possible also, that small banks can band together to use equipment on a community basis. Or small banks can make use of service bureaus. The time may come, too, when EDP service may be offered by city correspondents on a fee basis.

AUDITING AND ELECTRONIC DATA PROCESSING

*Goodrich F. Cleaver, General Dynamics Corp., Ft. Worth, Texas
JOURNAL OF ACCOUNTANCY, November 1958; pages 48-54*

Twenty-two books, pamphlets, and articles are described and listed which deal with audit problems arising from machine and electronic accounting. These begin with a prophetic article written in 1940 about the then new punch card accounting methods, and progress through the 1950's to the present. Both the suggested reading list and the annotation provide a guide to the auditor in an important problem area arising in his immediate future.

THIS ELECTRONIC WORLD

THE CONTROLLER, November 1958; page 550

The Hospital Research and Educational Trust will sponsor a study on the use of EDP equipment for hospitals. The study will be made at the Baylor University Hospital.

ECONOMIC AND SOCIAL IMPLICATIONS OF AUTOMATION—A BIBLIOGRAPHIC REVIEW

Edited by Gloria Cheek

Published by Labor and Industrial Relations Center, Michigan State University, East Lansing, Michigan. \$1.25

The trouble with compiling a bibliography is that you can never please everybody. Someone is sure to say, after you have labored long and lovingly over your task, "Why did you include this--and how come you left that out?"

610 entries from 1954 to 1957

This is certainly a detailed piece of work, aimed at a segment of knowledge which lies at the crossing point of human relations and automation. Undoubtedly the editor has brought together many worthy articles, papers and books, and many of them are well annotated. However, we can't help noting some glaring omissions and some listings (not annotated) which we suspect have been picked out of an index and are related to the subject at hand only by some accidental connotation of the title.

Another frustration which the bibliographer must endure is the endlessness of the task. No sooner has the bibliography been compiled, than it is out of date, and this is especially true in the field of automation. For example, we note that only the 1955 edition of Electronics in Business, The Controllershship Foundation's Reference Guide has been mentioned. There are 610 entries in the bibliography, divided into the following Sections: General; Manpower and Employment; Society and Government; Selection, Training and Job Requirements; Human Relations; Collective Bargaining; Management Organization and Planning; Office Automation and White-Collar Workers; Case Studies and Company Experience; and Bibliographies.

Management Sciences

OPERATIONS RESEARCH RECONSIDERED—SOME FRONTIERS AND BOUNDARIES OF INDUSTRIAL OR

Published by American Management Association

Fourteen papers are included in this report, and cover a wide range of OR applications and opinions. In "Industrial Operations Research in the United States," the results of a survey conducted by the AMA and Arthur Andersen & Co. are given. Of 631 companies responding, 51.3% said they are using OR techniques, and more than half the remainder plan to in the future.

The aircraft industry has the largest number of people working in OR--about 20 per company compared with six or seven in other companies. The background of most OR people is engineering,

mathematics, or statistics, in that order. More than half of the companies recruit their OR personnel from within the company, the remainder obtain people from universities and other companies. Training is provided through university courses, in-company instruction, and by consultants, in that order. Production problems are the most popular subjects of OR activity. Savings of more than \$100,000 were reported by 17 companies. Two companies claimed savings over \$2 million, and five companies claimed savings of more than \$1 million.

Some are disenchanted

An interesting contrast of opinion about the value of operations research is seen in two of the papers. In "The Use of Operations Research in a Small Company," the President of Noreen Incorporated describes the use of OR in budgeting their advertising funds and in sales forecasting. However, the Director of Market Research of the Home Products Division of Rheem states his opinion in the title of his paper: "OR in Market Research: A Waste of Time and Effort." He feels that too little reliable and concrete data can be obtained in the marketing field to justify decision-making by mathematical means, and that the judgment of men experienced in sales and marketing produces far better results.

Among the pro articles is one on OR in aircraft design. Other articles in this section indicate that OR is not a panacea, but is a good tool for management when used correctly.

The final section of the report contains six examples of operations research in industrial applications. These cover economic planning, inventory control and distribution, loading and scheduling, cafeteria administration, plant location, and business trend forecasting.

Price of the report is: \$2.50 for AMA members; \$3.75 for non-members.

Systems Analysis

SYSTEMS DESIGN AND PROGRAMMING FOR VARIABLE SIZED ITEMS

UNIVAC REVIEW, Summer, 1958; pages 21-24, 27-28

The systems design for a computer application consists of a complete description of the flow of data, including: a list of the equipment to be used and any specifications which must be clarified; a description of each data processing operation or "run" including the inputs and outputs with their origins or destinations indicated and the processing which is to be done; and a description of each tape file, including volume of data, frequency of use, percentage of activity,

and the item size and layout for each file. This information is then used as a basis for time estimates and cost figures which are used to determine the feasibility of using a computer and the savings which may be realized.

*Variable size item is systems
analysts' tool*

The systems analyst's job will be easier if he understands and uses all the tools available to him. One of these is the variable sized item. When properly used, the variable sized item can bring great savings in time and cost in data processing operations. An "item" is the basic unit of a tape file, and contains the alphanumeric information required to produce the desired results in the data processing operation.

The size of an item, i. e., the number of digits which are required to make up a basic item, depends on several factors, in addition to the amount of basic data needed: 1) the computer's particular fixed word length (it may be necessary to "fill" the item with zeros or spaces until the next multiple of digits is reached); 2) its intended use in the system (items used solely with the central computer are not as limited in size as are those used with peripheral equipment); 3) frequency of its use in whole or part (if every item in a file is processed, the efficiency of an operation depends more upon the item size and layout; if only a small percentage of the items in a file are processed, this efficiency depends more upon the volume of tape to be passed, and the item should be designed to reduce the total length of the file); 4) the volume of data to be processed (the larger the volume, the greater the need for reducing the amount of fill which wastes space and time in passing a tape file through the computer; this may be done by making items variable in size, based upon the frequency of appearance of their parts).

A balance of these and other factors must be weighed carefully in selecting the item size which will produce the most efficient results. Variable sized items must contain information which tells how many words are in the item, and if the item contains trailers, some means must be available for determining the size of each trailer. This may be done by storing the actual size within the item or trailer itself, or, in the case of trailers, a decoding system may be used.

*Bootstrapping for
program control*

Program control of advancing variable sized items within the computer is by "bootstrapping," i. e., determining the size of the item upon which action is completed and modifying instructions by this amount to advance to the beginning of the next item. When the location of the next item is beyond certain set limits (usually 60), blocks are transferred, read or written as required and the instructions adjusted by the amount of the limit.

The most common types of variable sized items are composed of headers and trailers. Headers of variable sized items are generally all one size in any one file and contain information which appears in 100% of the records. This information includes the size of the item as well as item keys and other data. It will also include fields for

Types of variable size items

information which may not be present 100% of the time but, in normal processing, may require 100% activity, i. e., every item is examined for this field and appropriate action taken. Examples would be prefixes and suffixes to keys, selection dates, control total data, or action codes. The header may also contain valid information of less than 100% occurrence in place of fill. In certain cases, the header may contain information pertaining to trailers such as codes to indicate if certain trailers are included in the item or not, and/or information which gives the relative location (within the item) of certain trailers.

The arrangement of information within a header is important. Usually the key or keys and the item size appear in the first word. Action dates and codes follow, along with control information if required, in the next two or three words. This arrangement allows a program to pick up a minimum number of words from each item when there is low activity. Other data follows and any trailer information appears last since it is probably less frequently used. Fields, especially amounts, should not be split from word to word if it can be avoided. Fields should be arranged if possible, with program techniques in mind. Fields of the same size should be lined up to facilitate the use of extract patterns. Amount fields and factors such as percentages should be arranged so that a minimum of shifting will be required. Alphabetic information should be arranged for ease in editing since it most likely will be used for printing. Item sizes or trailer locations should be placed so that modification of instructions can be accomplished most efficiently. The header of a variable sized item is ordinarily followed by one or more trailers.

Trailers and how to locate them

Trailers within variable sized items may be of either fixed or variable lengths. Usually a trailer is designed as a fixed number of words which contain all of the information needed to describe a particular addition to a basic record. A trailer must contain some designators or codes which describe its use, in order that it may be found, and its size, so that bootstrapping from trailer to trailer may be accomplished, if this method is used. Three methods of locating and using trailers in processing are available. The first method is to bootstrap from trailer to trailer until the desired one is found and then transferred to working storage. A second method explodes an item by placing the trailers in fixed locations, then the fixed trailer locations are inspected for the presence of the desired trailers. This requires the item to be compressed upon completion of the processing. The third method locates the trailer from information stored in the header. Combinations of these methods may also be used.

Some disadvantages of variable size items are:

1. Variable sized items should be used primarily for low activity file maintenance operations.
2. The housekeeping and processing of variable sized items requires bootstrapping, trailer searching and other additional complicated time-consuming routines. Preselection

is impractical. Automatic coding will probably not be applicable for some time.

3. Sorting is not recommended for variable sized items, although it may be possible in the future.
4. Listing files and data stored in variable sized item format is very difficult to read. Editing or padding of each item is required.
5. Variable sized items do not lend themselves to random access and only by bootstrapping can items be located.

Variable sized items have a definite place in data-processing operations. Their use is limited by disadvantages, but their advantages more than compensate for these disadvantages when they are properly used. The systems analyst and the programmer must use discretion in using this valuable tool, and he must also improvise variations which have not been worked out previously.

Programing

LONG LETTER TO THE EDITOR

COMPUTING NEWS, November 1, 1958; pages 3-6

Inspired by an article by Jack Granholm describing his methods of teaching programmers, Fred Gruenberger gives his ideas on the subject, and hopes his letter will stir some interest and debate. Some of his suggestions include:

1. Use an internally programed computer for training (rather than a small externally programed computer as Granholm recommended).
2. Programers should learn the basic principles of programing in an academic atmosphere. He takes the universities to task for tending to look down their noses at programing instruction as "vocational training."
3. Provide students with training by some of the real experts (such as Dr. Grace Murray Hopper) through the medium of the training film.
4. There is a need for some organized attempts by industry to learn how to teach programing and provide the teachers with the necessary training.

((See DPD, August 1958, page 12, "Training The Computer Programmer," for abstract of Granholm's article.))

COMPUTER PROGRAMMING FOR YOUNG STUDENTS

Harley Tillitt, U.S. Naval Ordnance Test Station, China Lake, Calif.

JOURNAL OF ASSOCIATION FOR COMPUTING MACHINERY, October 1958; pages 309-318.

Two experimental classes have been conducted at Burroughs Junior High School, China Lake, California, by employees of the U. S. Naval Ordnance Test Station, in programing and coding for IBM computers. The results of the experiments "showed that young students are able to understand some of the logical processes required in the translation of mathematical problems into symbolic forms suitable for processing on large digital computers." The students were selected from seventh and eighth grades for their above-average abilities. The first experiment, with the seventh graders, consisted of one class period each day for a week. The eighth graders received one period each day for two weeks. Samples of the students' coding sheets are included, with corrections made by the instructor. "The experiments indicate that many of the concepts of high-speed digital computer programming can be understood by individuals who do not know 'How the Machine Works,' and who have not had extensive mathematical training."

PROGRAMMING—A NEW PROFESSION FOR YOU!

Published by Remington Rand Univac

This little 32-page booklet introduces the new profession of programmer to the prospective student. Without going into technical detail, it describes the job of the programmer in four areas of activity: analysis of the problem, application of the problem to the computer, flow-charting, and coding. A simplified selection problem is given to show how the four areas apply. A short bibliography is included, along with a list of institutions offering programming courses. To receive a copy of the booklet, write to Remington Rand, 315 Fourth Avenue, New York 10, New York, and ask for U-1555.

Applications

CHRYSLER PRE-PLANNING COMPUTER USE

COMPUTING NEWS, November 15, 1958; pages 11-14.

Chrysler Corporation uses its IBM 650 to maintain permanent records of identification for every part used in its cars. The parts are identified by name, number and other information, and are stored on magnetic tape. These records are used for inventory control, plant scheduling, cost data, accounting functions, directing of incoming materials and outgoing completed vehicles, determining service requirements, policy and warranty data, and many other functions. Original parts data comes from the Engineering Department at the time the part is designed, and is punched on cards for immediate use in material requisitions, catalog part listings, bills of materials and material specifications.

Tests have been made recently on the use of transceivers to relay information to other plants. If successful, the system will be enlarged, and will make it possible to transmit specifications from the Engineering Department to other plants on a 24-hour basis.

Equipment

DUAL CODE PERFORATION: A PRACTICAL COMMON LANGUAGE

Cummins-Chicago Corporation, Chicago, Illinois

((This booklet was made up for very limited distribution, so copies may not be readily available. However, it is briefly reviewed here for its general interest in the bank automation field.))

A system for the mechanized handling of paper documents is described, which is based on the principle of reading perforated holes in the documents. A dual code is proposed: perforations in the form of arabic numerals, for human reading, plus the same numbers in the common 5-bit code, for machine reading. Equipment pictures are shown and approximate prices are quoted. The system is proposed for ten types of applications, including oil company credit cards, merchandise price tags, and the handling of bank checks.

In the area of handling bank checks, the booklet describes how the system might be used to supplement the standard American

*Codes for humans and
machines punched
inexpensively*

Bankers Association system which uses magnetic characters. Its application to smaller banks is stressed, because the costs of the perforators and sorters are so much lower than for magnetic character imprinters and electronic sorters. It is even possible that checks could have both types of number coding on them--perforations and magnetic numbers.

The booklet makes other points of interest for the perforated code. In general, it requires less redesign of the check than does the magnetic character system, and thus might be used for those customers who object to redesigning their checks to accommodate the magnetic characters. The verification of all perforated checks is a relatively simple affair (to assure that the bank number and account number have been properly punched), as compared with the more elaborate verification procedures needed for the magnetic character system. The cost of the Perf-O-Sorter is claimed to be between \$12,000 and \$15,000, well below the cost of a magnetic character sensing sorter.

*This method can meet
ABA's specifications*

The booklet contains six pages which discuss (a) reasons given by the ABA Committee for designating magnetic characters, (b) how magnetic characters meet the original specifications set out by the committee, and (c) how the dual code perforation meets those same specifications.

THE EYE

Intelligent Machine Research Corporation of Alexandria, Virginia, has designed a reader called "The Eye" which can read specially designed numerals printed on cashier stubs and punch cards for cash accounting for utilities and other businesses. The machine punches cards from the typed stubs at the rate of 100 a minute. The special type is designed for maximum reliability, and has self-checking characteristics. It may be installed on conventional IBM Type 407 tabulators. The Eye will reject stubs which are imperfectly printed or which have crossed-out numerals. The Eye also watches for out-dated stubs.

DIGITAL COMPUTERS GROW IN GREAT BRITAIN

*K. Tylden-Pattenson and G.M.E. Williams; P. E. Management Group Ltd., London
CONTROL ENGINEERING, November 1958; pages 103-107.*

At the end of 1957 there were 34 computers being used for business data processing in Great Britain, with 67 planned for 1958. This is shown in a table in this article. The article describes the scientific and business computers being manufactured in Great Britain, including the ZEBRA, a computer manufactured by Standard Telephone & Cables Ltd. in which the instructions themselves set up necessary circuitry for carrying out their functions.

Comment

BANK AUTOMATION

We often find that some question exists in people's minds on the role of the systems analyst, when installing electronic data processing systems. As a matter of fact, some computer manufacturers have adopted the term "programer" to cover both systems analysis and programing, perhaps giving the impression that programing the machine is the most significant task.

The system analyst's job in checking account automation

We would like to devote this Comment and the next one to a discussion of one of the largest EDP mechanization projects in the country--the automation of commercial checking accounts in banks--in order to illustrate the true breadth of a systems analyst's job. In discussing this, we will be concerned primarily with what an individual bank faces, and will mention only briefly the systems work already done under the auspices of The American Bankers Association.

As readers of DPD are aware, the American Bankers Association has standardized on a system for recording pertinent information on the bottom of the check in magnetic characters. This system was selected for a number of reasons. Identification information, such as bank identification and customer account number, can be recorded at the time the check is printed (called "pre-qualification"), so that only the amount of a check need be "key punched" when the check is received. Also, magnetic characters were chosen as least sensitive to mutilation and obliteration, in normal check handling. The magnetic characters are to be printed on the front of the check, to facilitate production and handling. These numbers will be "arabic" in form to facilitate human reading (although, in practice, the numbers look somewhat unusual to the human eye, for efficiency of electronic reading). The bottom 1/2" of the check is to be left clear of regular printing, for these magnetic characters (measure your own check, for interest). Forty-eight character positions are provided: 10 for amount, 8 for transit number and routing symbol of bank on which drawn, (bank identification), 19 for customer account number and other information, and the remainder for start-stop symbols and tolerances.¹ The development of this standard system has obviously taken a large amount of systems analysis effort, as excellently presented in an article reviewed in this issue.²

However, according to articles abstracted in DPD during recent months, there still are problems facing the systems analyst in each bank which is considering installing a mechanized system. These problems fall into the categories of systems design, production, and operation; and we will discuss these three categories. We assume that these problems are being solved successfully in those banks which are getting ready for automation, although we must admit that many of the articles so far are of the "warning" nature.

Systems Design

Three levels of systems design

One of the first problems facing the systems analyst in the individual bank is: how automatic should we go? Apparently there are three levels of automation being considered. The first is mechanized sorting of the bank checks, with regular bookkeeping machine posting to customer accounts. A magnetic character sorter may be too expensive for the smaller banks, and a sorter working with perforated holes in the checks has been proposed.³ The second level is called "semi-automatic" in the literature; it consists of a magnetic character sorter, plus electronic bookkeeping machines, such as the Postronic. The electronic sorter may be feasible for banks handling over 10,000 items per day, while the electronic bookkeeping machine may be feasible for banks handling only 900 checks and deposits and 600 balance moves per day.^{4, 5, 6} The third level is the fully automatic level, consisting of an electronic check sorter and an electronic computer. It is estimated that a bank must handle at least 50,000 items per day to economically justify this level of system.⁶

Five parallel systems

The next problem facing the systems analyst is that he must provide for not just one operating system, but five parallel ones:

1. The mechanized "information flow" system which posts transactions to customer accounts.
2. The mechanized "paper flow" system which handles the checks; the checks follow a different path from the information, part of the way.
3. A regular manual system for detecting and handling checks which have no magnetic characters or on which the characters have been crossed out, due to depositors who refuse to redesign their checks, some smaller banks which do not want to pay for magnetic character printing, the loaning of a check between one depositor and another, etc.³
4. A manual system for handling exceptions--the "stop payments" and overdrafts--which are detected while posting to customer's account. A human must then locate and pull the appropriate check from the mechanized "paper flow" system.
5. A manual system for handling rejects--checks where the electronic equipment cannot read the magnetic characters due to poor printing, folds in the check, or such.

Next, the systems analyst is confronted with the fact that the mechanized system really isn't completely mechanized; there are numerous manual operations involved and he must work out integrated procedures for the whole system. These manual operations include:

*Manual operations
are involved*

imprinting the "amount" on the check (including what to do if the girl operator makes an error and wants to erase the magnetic characters), developing listings and batch totals, comparing batch totals with totals developed in the electronic sorter, comparing subsequent sub-totals with batch totals, putting the checks in the sorter several times, verifying the customer signatures, filing the checks, and so on.⁶

Then the systems analyst is faced with other factors to consider, in his five manual-mechanized parallel systems:

- a. He must choose an efficient customer account numbering system; perhaps the account number should be purely random⁷ or should be designed for easy sorting by: high volume accounts, type of account, branch bank, alphabetic breaks, etc.⁸
- b. Then he is faced with the fact that these account numbers may not be as convenient as names, for manual sorting,⁹ so how does he sequence the customer file, numerically or alphabetically? (We have come across some contrary evidence on this point.)
- c. He must lay out a realistic schedule for redesigning and reprinting all of the customer checks.
- d. Plus his share of "hairy" problems: what to do in special cases, such as AT&T dividend checks and Sears Roebuck refund checks, which specify more than one drawee bank; the magnetic character system accomodates only one such bank.
- e. He must devise methods for verifying that the preprinted magnetic characters can be read by a machine reliably.³

No, there is a lot more to this systems analysis work than just programing. Next month, we will discuss some of the problems concerned with producing the magnetically imprinted checks and operating the system.

References:

1. "Automatic Handling of Checks," DPD, March, 1958, p. 4.
2. "Latest Developments in Electronic Processing of Checks," DPD, January 1959, p. 1.
3. "Dual Code Perforation," DPD, January, 1959, p. 13.
4. "Automatic Bookkeeping for Checking Accounts," DPD, March, 1958, p. 8.
5. "Electronic Posting in a 1600-Account Bank," DPD, Sept., 1958, p. 10.
6. "Extent of Automation in Commercial Bookkeeping," DPD, Sept., 1958, p. 8.

7. "Automation's Test: Does It Pay?" DPD, June, 1958, p. 3.
8. "Automation in Check Handling," DPD, April, 1958, p. 1.
9. "How Fast is Numeric Sorting?" DPD, November, 1957, p. 9.

TWO NEW MAGAZINES

The world of business electronics has been entered by two new magazines, aimed specifically at this field. They are: Machine Accounting and Data Processing, published by Gille Associates; and Management and Business Automation, published by The Office Appliance Co.

Judging from the first issue (a dangerous thing to do), Machine Accounting will be concerned primarily with practical problems in installing and using punched card equipment and electronic computers. Management, on the other hand, appears to be serving management people with a broader, background type of material. There should be a place for both approaches, and we wish them well. For their addresses, look at REFERENCES, page 22.

Meetings

Conference on Decision-Aiding Tools for Industry, sponsored by Detroit Chapters, AIIE and TIMS

Date: January 29-30, 1959
Place: Detroit, Michigan (Whittier Hotel)
Information: Mr. Robert P. Beals, Remington Rand-Univac,
 2978 West Grand Blvd., Detroit 2, Michigan

Eleventh Annual Industrial Engineering Institute, sponsored by University of California

Date: February 6, 7, 1959
Place: Simultaneous sessions at Berkeley campus and Los Angeles campus
Fee: \$30, including two luncheons and copy of printed Proceedings of the Institute
Information: Department of Conferences, University Extension,
 University of California, Berkeley 4, California; or
 Engineering Extension, University of California,
 Los Angeles 24, California

American Management Association 5th Annual Electronics Conference and Exhibit

Date: March 2-4, 1959
Place: New York City (Statler-Hilton Hotel)
Information: Roderick W. Smith, Assistant Manager,
Finance Division, AMA, 1515 Broadway,
New York 36, New York

Western Joint Computer Conference

Date: March 3-5, 1959
Place: San Francisco, California (Fairmont Hotel)
Theme: "New Horizons with Computer Technology"
Information: Mr. G. A. Barnard, Ampex Corp., 934 Charter St.,
Redwood City, California

Life Office Management Association Automation Forum

Date: April 13-15, 1959
Place: Chicago, Ill.
Information: Logan J. Massee, Massachusetts Mutual Life Insurance Company,
Springfield, Mass.

ORSA National Meeting

Date: May 14, 15, 1959
Place: Washington, D. C. (Shoreham Hotel)
Information: Operations Research Society of America,
Mt. Royal & Guilford Ave., Baltimore 2, Md.

"Expanding Horizons of Industrial Engineering," National Conference, American Institute of Industrial Engineers

Date: May 14-16, 1959
Place: Atlanta, Georgia (Biltmore Hotel)
Fee: Members, \$39.50; non-members, \$49.50. (Single event fees
also available)
Information: AIIE, 145 North High St., Columbus 15, Ohio

NOMA Conference and Exposition

Date: May 24-27, 1959
Place: New Orleans, Louisiana (Roosevelt Hotel)
Information: W. H. Latham, NOMA, Willow Grove, Pennsylvania

International Conference on Information Processing

Date: June 15-20, 1959
Place: Paris, France
Information: U. S. Committee for the First International Conference on
Information Processing, Box 4999, Washington 8, D. C.

British Computer Society First Annual Conference

Date: June 22-25, 1959

Place: Cambridge, England

Information: British Computer Society, Finsbury Court,
Finsbury Pavement, London EC 2, England

NMAA National Conference

Date: June 24-26, 1959

Place: St. Louis, Missouri (Chase-Park Plaza Hotels)

Information: National Machine Accountants Association,
208 South Main Street, Paris, Illinois

1959 ACM National Conference

Date: Summer, 1959

Place: M. I. T.

Information: F. Verzuh, Massachusetts Institute of Technology,
Cambridge, Mass.

TIMS International Meeting

Date: September, 1959

Place: Paris, France

Information: The Institute of Management Science, Attn: Harold Cauvet,
250 North Street, White Plains, New York

ISA Conference

Date: September 21-25, 1959

Place: Chicago, Illinois

Information: Instrument Society of America, 313 Sixth Avenue,
Pittsburgh 22, Pennsylvania

SHARED PROGRAMING GROUPS

USE--April 1-3, 1959, at Chicago, Illinois

SHARE XII--February 17-20, 1959, at New York (Statler Hotel)

SHARE XIII--August 18-21, 1959, at Seattle, Washington (Olympic Hotel)

Training

Seminar--Application of Operations Research Techniques to Inventory Control; sponsored by American Management Association

Date: January 14-16, 1959
Place: New York City (Hotel Astor)
Fee: AMA Members: \$150 Nonmembers: \$175
Information: American Management Association,
1515 Broadway, New York 36, N. Y.

Orientation Seminar--Application of EDP Techniques to General Accounting; sponsored by American Management Association

Date: January 12-14, 1959
Place: New York City (Hotel Astor)
Fee: AMA Members: \$150 Nonmembers: \$175
Information: Same as above

Workshop Seminar--Analyzing Operations for the Application of Electronics; sponsored by American Management Association

Date: January 19-21, 1959
Place: New York City (Hotel Astor)
Fee: AMA Members: \$125 Nonmembers: \$150
Information: Same as above

Operations Research--short course

Date: January 19-30, 1959
Place: Case Institute of Technology, Cleveland, Ohio
Prerequisites: Research experience and sufficient knowledge of mathematics to understand mathematical symbolism.
Fee: \$375, including 10 luncheons, six dinners, texts and supplies
Information: Dr. E. Leonard Arnoff, Asst. Director, O. R. Group,
Case Institute of Technology, 10900 Euclid Avenue,
Cleveland 6, Ohio

Engineering and Management Course

Date: January 26 - February 5, 1959
Place: University of California at Los Angeles
Information: R. R. Cole, College of Engineering, Room 3104
University of California, Los Angeles 24, California

Principles of Computer Programming

Date: January 12-23, 1959
Fee: \$400
Offered by: KCS Data Control Ltd., 20 Spadina Road, Toronto 4, Canada

References

The publishers of books and periodicals mentioned in this issue of DATA PROCESSING DIGEST are listed below for your convenience in writing for more complete information.

American Management Association
1515 Broadway
New York 36, New York

Auditgram
38 S. Dearborn St.
Chicago 3, Illinois

Banking
12 East 36th St.
New York 16, New York

Computing News
12805 - 64th Ave. South
Seattle 88, Washington

Control Engineering
330 West 42nd St.
New York 36, New York

The Controller
Two Park Avenue
New York 16, New York

Harvard Business Review
Soldiers Field Station
Boston 63, Mass.

Journal of Accountancy
270 Madison Ave.
New York 16, New York

Journal of A. C. M.
Mt. Royal & Guilford Ave.
Baltimore 2, Maryland

Journal of Industrial Engineering
145 North High St.
Columbus 15, Ohio

Machine Accounting and Data Processing
956 Maccabees Building
Detroit 2, Michigan

Management & Business Automation
600 W. Jackson Blvd.
Chicago 6, Illinois

Stores
100 West 31st St.
New York 1, New York

United States Investor
286 Congress St.
Boston 10, Mass.

Univac Review
Remington Rand
315 Fourth Ave.
New York 10, New York

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